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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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MCKENNA LONG & ALDRIDGE LLP
1900 K STREET, NW
WASHINGTON, DC 20006

EXAMINER	
VAN DOREN, BETH	
ART UNIT	PAPER NUMBER
3623	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/072,971	HARRIS, JOHN M.	
	Examiner	Art Unit	
	Beth Van Doren	3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 7-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 7-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. The following is a non-final office action in response to communications received 12/12/2006. Claims 1-5 and 7-11 have been amended. Claims 1-5 and 7-14 are pending.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-5 and 7-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Claim 1 recites computing a plurality of statistical models for a probability of unscheduled component demand, then collecting historical data, and then using the collected historical data to select one computer statistical model from the plurality of computed models. However, the originally presented specification does not recite that the statistical models are first computed. See figure 2, where in step 215, a set of generalized statistical models is established. This is further explained on page 7, paragraph 23, of the specification. This models are established based on the selection of a number of failure models. Next historical data is collected (figure 2, step 220, and page 10, paragraph 29). This data is used to eliminate variables in the in models, and then one model is selected. Then in figure 2, steps 235 and 245, a model is selected and then unscheduled component demand is computed for the selected model. Thus, in

the specification it appears that the models are first established, then the historical data is collected and used to eliminate variables in the multiple models, and then the data is used to select one model (the data). Therefore, it is respectfully submitted that the current amendment requiring the plurality of statistical models to be first computed and then historical data being collected is not disclosed in the originally presented specification.

Claims 2-5 depend from claim 1 and therefore contain the same deficiencies.

Claim 4 recites "wherein selecting one computed statistical model comprises selecting an equation for λ. However, it appears in the specification, pages 7-8 and 11 and figure 2, that the equations for λ are included in the established linear models and that the chosen model is based on which model gives the best estimate of λ. Thus, it does not seem that an equation for λ is selected when selecting a model, but rather the model is selected based on it best estimating λ (which is already included in the model). Clarification is required.

Claim 7 contains similar limitations to claim 1 and is therefore rejected for the same reasons set forth above.

Claims 8-14 depend from claim 7 and therefore contain the same deficiencies. Further, claim 11 recites equivalent limitations to claim 4 and therefore contains the same deficiencies.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-5 and 7-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The preamble of claim 1 recites "in a system for maintaining a plurality of assemblies including a plurality of replaceable components, the system have a computer with software for implementing a method of determining a time interval [...], the method comprising". It is not clear what specific statutory class is being claimed in this preamble – a system or a method. Further, if a system is being claimed, it is not clear how the body of the claim would comprise a system, as the body of the claim merely comprises steps. Further, the preamble only recites that that the system has a computer with software. It is not clear how a single computer makes up a system. Clarification is required. For examination purposes, this claim has been construed as a method.

Claim 1 further recites "computing a plurality of statistical models for a probability of unscheduled component demand as a function of time and a failure rate of a component" and then recites "using the historical component demand data to select one computed statistical model". It is not clear as to how mere collected data would be used to select an already computed model without some manipulation of the collected data. Clarification is required. Examiner notes that it seems in the specification that the collected historical data is first used to eliminate variables in the plurality of established models of the system and then one model is selected to be used as the overall model for modeling unscheduled demand. See figure 2 and pages 10-11.

Claims 2-5 depend from claim 1 and therefore contain the same deficiencies.

Claim 7 contains similar limitations to claim 1 and is therefore rejected for the same reasons set forth above.

Claims 8-14 depend from claim 7 and therefore contain the same deficiencies.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claim 7 is rejected under 35 U.S.C. 101 because it does not recite subject matter within one of the statutory classes. Claim 7 recites "software encoded with a program for forecasting [...], the program when executed performing the steps of:", which is construed as a computer program or software per se. Computer programs and software are merely a set of instructions <u>capable</u> of being executed by a computer. Without specific language stating that a computer or computer processor is actively executing the computer program/software, computer programs and software are not considered to be statutory processes or machines. Therefore, there must be some functional act performed by a computer or computer element on the software/computer program to impart statutory subject matter. Correction is required.

Claims 8-14 depend from claim 7 and therefore contain the same deficiencies.

Allowable Subject Matter

8. Claims 8-9 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 112, 1rst and 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erke et al. (U.S. 2003/0061126) in view of Tegethoff (U.S. 5,539,652).

As per claim 1, Erke et al. teaches a method of determining a time interval at which unscheduled demand for the components is expected to occur, the method comprising:

establishing a plurality of statistical models for a probability of unscheduled component demand as a function of time and a failure rate of a component, wherein each of the plurality of statistical models includes a linear combination of variables pertaining to component use (See paragraphs 0017, 0041-4, 0076, 0078-9, wherein statistical models are established by the computer wherein the user enters data and the computer builds and implements the model. See paragraphs 0026, 0029-32, wherein the probability of unscheduled component demand is considered in the models using the parameters of time and a failure rate of a component);

for each component, collecting historical unscheduled component demand data (See paragraphs 0016-7, 0026, 0029, 0031 wherein data concerning fill rates for demand is collected);

for each component, using the collected historical unscheduled component demand data to select one statistical model from the plurality of statistical models, wherein the selected model most closely matches the historical unscheduled component demand data (See paragraphs 0017, 0041-4, 0076, 0078-9, wherein statistical models are established by the computer wherein the user enters data and the computer builds and implements the model. The model is fit to the

specific data concerning the problem such that it represents the specific variables and circumstances of the situation at hand);

for each component, selecting an allowable probability of underestimating an average failure rate, α (See paragraphs 0026 and 0029-0031, wherein the probability of having to few parts in inventory to meet failure demand is set forth); and

using the selected statistical model to calculate inventory levels to meet unscheduled component demand (i.e. demand based on parts failure) (See figure 3, paragraphs 0017, 0026, 0041-3).

However, Erke et al. does not expressly disclose selecting a previously computed statistical model based on collected historical data or calculating a time interval at which the unscheduled component demand is expected to occur.

Tegethoff discloses selecting a previously computed statistical model based on collected historical data and calculating a time interval for failure (See column 10, lines 40-55, column 27, lines 55-67, and column 28, lines 40-50, which discloses selecting fault models based on historical fault data and probability of failure at a time of failure and at a certain confidence interval).

Both Erke et al. and Tegethoff disclose monitoring the use of components to provide data concerning failure and wear-out of components to indicate demand for additional components. Erke et al. discloses computer based optimization which takes into account data such as request rates based on failure, time, parts procurement time performance metrics, fill rate probabilities, etc. to obtain needed and optimized component inventory levels. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have the optimization

model output a time period when the unscheduled component demand is expected to occur in order to more efficiently optimize customer part procurement times by more accurately identifying when stock of components is needed to meet demand. See paragraphs 0013-5, 0033, 0039, of Erke et al., which discuss the importance of timely parts procurement. Further it would have been obvious to one of ordinary skill in the art at the time of the invention to select fault/failure models based on historical data in order to increase the accuracy of the model results based on past performance. See column 10, lines 40-55, of Tegethoff.

As per claim 2, Erke et al. discloses using statistical models (See paragraphs 0017 and 0041-3) and selecting an allowable probability of underestimating an average failure rate, α, and that the unscheduled component demand will not exceed the allowable probability of (1- α) (See paragraphs 0026 and 0029-0031, wherein the probability of having to few parts in inventory to meet failure demand is set forth).

However, Erke et al. does not expressly disclose and Tegethoff discloses calculating a time interval when a probability of the next unscheduled component demand event equals the probability that the unscheduled component demand will not exceed the allowable probability (1- α) (See column 10, lines 40-55, column 27, lines 55-67, and column 28, lines 40-50, which discloses selecting fault models based on historical fault data and probability of failure at a time of failure and at a certain confidence interval).

Both Erke et al. and Tegethoff disclose monitoring the use of components to provide data concerning failure and wear-out of components to indicate demand for additional components. Erke et al. discloses computer based optimization which takes into account data such as request rates based on failure, time, parts procurement time performance metrics, fill rate probabilities,

etc. to obtain needed and optimized component inventory levels. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have the optimization model output a time period when the unscheduled component demand is expected to occur in order to more efficiently optimize customer part procurement times by more accurately identifying when stock of components is needed to meet demand. See paragraphs 0013-5, 0033, 0039, of Erke et al., which discuss the importance of timely parts procurement.

As per claim 3, Erke et al. teaches wherein each statistical model comprises a Poisson distribution having a parameter λ (See paragraphs 0076-9, which disclose a Poisson distribution with a parameter λ).

As per claim 4, Erke et al. teaches wherein selecting the statistical model comprises selecting an equation for λ (See paragraphs 0043-4, 0065, 0072-9).

As per claim 5, Erke et al. teaches established models using unscheduled demand to predict components needs and failure rates (See paragraphs 0017, 0041-4, 0076, 0078-9, wherein statistical models are established by the computer wherein the user enters data and the computer builds and implements the model. See paragraphs 0026, 0029-32, wherein the probability of unscheduled component demand is considered in the models using the parameters of time and a failure rate (i.e. fill rate based on need due to failure) of a component). However, neither Erke et al. nor Tegethoff expressly discloses eliminating insignificant variables and variables that cause multicollinearity from each of the established models using historical unscheduled demand.

It is well known in statistics to detect and remove variables that are found to be insignificant or cause multicollinearity in models. The claims do not provide the specific models or variables and provide no specific process or reason for the removal of the variables, just that

the removal occurs. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to remove variables that are insignificant and variables that cause multicollinearity in order to decrease the likelihood of errors in the model by removing the variables that statistically cause these errors to occur. This benefit is well known in the art of statistics.

11. Claims 7 and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erke et al. (U.S. 2003/0061126) in view of Wetzer (U.S. 6,738,748) and in further view of Tegethoff (U.S. 5,539,652).

As per claim 7, Erke et al. teaches a computer software encoded with a program for forecasting unscheduled demand for a plurality of different components, the program when executed performing the steps of:

establishing a plurality of statistical models for modeling unscheduled demand for the components as a function of a failure rate of each of the components, wherein each of the plurality of statistical models includes a linear combination of variables pertaining to component use (See paragraphs 0017, 0041-4, 0076, 0078-9, wherein statistical models are established by the computer wherein the user enters data and the computer builds and implements the model. See paragraphs 0026, 0029-32, wherein the probability of unscheduled component demand is considered in the models using the parameters of time and a failure rate of a component);

for each component, collecting historical unscheduled component demand data (See paragraphs 0016-7, 0026, 0029, 0031 wherein data concerning fill rates for demand is collected);

for each component, selecting one of the statistical models of the plurality of statistical models for a probability of unscheduled component demand, wherein the selected statistical model most closely matches the historical unscheduled demand data corresponding to the component (See paragraphs 0017, 0041-4, 0076, 0078-9, wherein statistical models are established by the computer wherein the user enters data and the computer builds and implements the model. The model is fit to the specific data concerning the problem such that it represents the specific variables and circumstances of the situation at hand); and

using the selected statistical model to calculate inventory levels to meet unscheduled component demand (i.e. demand based on parts failure) (See figure 3, paragraphs 0017, 0026, 0041-3).

However, Erke et al. does not expressly disclose and Wetzer discloses determining a date at which a cumulative probability of unscheduled component demand reaches a predetermined threshold (See column 2, lines 17-28, column 5, lines 33-47, column 7, lines 1-20, column 10, line 35-column 11, line 21, which discusses threshold values for the probability of failure).

However, Wetzer does not expressly disclose selecting a previously computed statistical model based on collected historical data.

Tegethoff discloses selecting a previously computed statistical model based on collected historical data and calculating a time interval for failure (See column 10, lines 40-55, column 27, lines 55-67, and column 28, lines 40-50, which discloses selecting fault models based on historical fault data and probability of failure at a time of failure and at a certain confidence interval).

Both Erke et al. and Wetzer disclose monitoring the use of components to provide data concerning failure and wear-out of components to indicate demand for additional components. Erke et al. discloses computer based optimization which takes into account data such as request rates based on failure, time, parts procurement time performance metrics, fill rate probabilities, etc. to obtain needed and optimized component inventory levels. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have the optimization model determine when a cumulative probability of unscheduled component demand reaches a predetermined threshold, associated with a date, in order to more efficiently optimize customer part procurement times by more accurately identifying when stock of components is needed to meet demand. See paragraphs 0013-5, 0033, 0039, of Erke et al., which discuss the importance of timely parts procurement.

Further, Both Erke et al. and Tegethoff also disclose monitoring the use of components to provide data concerning failure and wear-out of components to indicate demand for additional components. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to select fault/failure models based on historical data in order to increase the accuracy of the model results based on past performance. See column 10, lines 40-55, of Tegethoff.

Claims 10 and 11 recite equivalent limitations to claims 3 and 4, respectively, and are therefore rejected using the same art and rationale set forth above.

As per claim 12, Erke et al. teaches wherein the failure rate of the component is a function of operation (See paragraph 0026, which disclose wear out based on operation).

However, Erke et al. does not expressly disclose that the failure rate of a component is the function of temperature.

Wetzer et al. teaches wherein the failure rate of the component is a function of the use of the component and environmental factors related to the component (See column 4, lines 45-65, column 5, lines 33-47, column 6, lines 55-67, column 8, lines 22-35, and column 10, lines 1-30, wherein the failure rate is based on usage). However, Wetzer does not expressly disclose temperature as usage.

Both Erke et al. and Wetzer disclose monitoring the use of components to provide data concerning failure and wear-out of components to indicate demand for additional components. Wetzer discloses monitoring the use of components to provide data such as longevity, environmental factors, use profiles, and operating limits, this data indicative of when maintenance and failure of the component will occur. It is old and well known in mechanics that parts have specific temperature ranges in which they are supposed to operate. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to consider the failure rate as a function of temperature and include this in the system of Erke et al. in order to more accurately plan for failure and maintenance, thus reducing the downtime of equipment that causes a reduction in revenue. See column 1, lines 50-65, column 11, lines 1-10, and column 14, lines 40-67, all of which equate better planning to money.

As per claims 13 and 14, Erke et al. teaches wherein the failure rate of the component is a function of operation (See paragraph 0026, which disclose wear out based on operation). However, Erke et al. does not expressly disclose and Wetzer teaches wherein the failure rate of the component is a function of hours of operation (See column 4, lines 45-65, column 5, lines 33-

47, column 8, lines 22-35, and column 10, lines 1-30, wherein the failure rate is based on the hours a component operates) and wherein the failure rate of the component is a function of flight cycles (See column 4, lines 45-65, column 5, lines 33-47, column 6, lines 55-67, column 8, lines 22-35, and column 10, lines 1-30, wherein the failure rate is based on flight cycles).

Both Erke et al. and Wetzer disclose monitoring the use of components to provide data concerning failure and wear-out of components to indicate demand for additional components. Erke et al. discloses computer based optimization which takes into account data such as request rates based on failure (i.e. wear out), time, parts procurement time performance metrics, fill rate probabilities, etc. to obtain needed and optimized component inventory levels. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have the optimization model include the failure of wear out based on the hours of operation of the component in order to more efficiently optimize customer part procurement times by more accurately identifying when stock of components is needed to meet demand. See paragraphs 0013-5, 0026, 0033, 0039, which discuss the importance of timely parts procurement.

Response to Arguments

12. Applicant's arguments with respect to claims 1-5 and 7-14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ridolfo (U.S. 6,735,549) discloses confidence intervals and estimating the failure data associated with monitored systems.

Sheldon et al. (U.S. 5,765,143) teaches managing a parts inventory for automobiles that considers failure data.

Mozumber et al. (U.S. 5,408,405) teaches statistical process control considering fault data.

Kuettner et al. (U.S. 2003/0046250) teaches statistical analysis leading to a best fit model for the rate of failure including linear functions and functions of time.

Tyron III (U.S. 7,016,825) teaches predicting the failure rate of a component.

"Method for Estimating Equipment Reliability" (IBM Technical Disclosure) teaches a statistical tool that models failure times and uses actual data concerning the failures.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Beth Van Doren whose telephone number is (571) 272-6737. The examiner can normally be reached on M-F, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq Hafiz can be reached on (571) 272-6729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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March 5, 2007

Beth Van Doren
AU 3623
Patent Examiner